Galactic HI Science and SKA1

NAOMI MCCLURE-GRIFFITHS
Science Drivers

Study the physical processes at play in the Galaxy and Magellanic Clouds to sub-parsec scale
  • HI emission over all Galactic and Magellanic environments
  • HI absorption against polarised background? (Dickey et al 1998)

Probe the temperature distribution
  • HI absorption towards continuum sources, probing both cold and warm HI
  • HI self-absorption towards background HI

Comparison of Galactic/LMC/SMC environments
Galactic HI requirements

Requirements:

• Maximise field-of-view & survey speed
• Bi-modal baseline needs
  – Lots of short baselines for surface brightness sensitivity
  – Lots of long baselines for HI absorption
• Spectral resolution of \(\sim 0.1 \text{ km/s}\) to resolve narrow HI lines
  (see for example Li & Goldsmith 2003; GALFA-HI work Peek et al.)
  – Need this over about 1000 km/s
• Angular resolution of <10 arcsec at <1 K sensitivity
Comments on Baseline Design

SKA1-Mid:
- Excellent surface brightness sensitivity - useful for smaller areas of very low column density
- Too few long baselines for absorption
- Survey speed limited
- Need better velocity resolution ~0.1 km/s

SKA1-SUR:
- Best survey speed
- Baseline distribution about right. Good for absorption, could use a few more short baselines for emission
- Need better velocity resolution ~0.1 km/s

SKA1-Mid is not bad, SKA1-SUR is better